Relationships Between Provider-Led Health Plans and Quality, Utilization, and Satisfaction

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ABSTRACT

OBJECTIVES: To compare healthcare quality, utilization, and patient satisfaction between provider-led health plans (PLHPs) and non-PLHPs.

STUDY DESIGN: Observational study of 2016 Medicare Advantage (MA) plans.

METHODS: We included 3 quality outcomes (MA Star Rating System, Healthcare Effectiveness Data and Information Set [HEDIS] effectiveness aggregate score, and HEDIS access aggregate score), 4 utilization outcomes (HEDIS average procedure rates, discharge rates, inpatient days, and readmission probability), and 1 patient satisfaction outcome (National Committee for Quality Assurance consumer satisfaction rating). We performed regression analysis to compare the 8 selected outcomes between PLHPs and non-PLHPs, controlling for key covariates, including region, profit status, patient risk, and patient-related and provider-related demographics.

RESULTS: Our sample included 64 contracts offered by 31 PLHPs (representing 3,197,284 enrollees) and 311 contracts offered by 55 non-PLHPs (representing 13,881,210 enrollees). Compared with non-PLHPs, in our primary multivariable model, PLHPs were associated with higher star ratings (β = 0.41; 95% CI, 0.15-0.67), effectiveness scores (β = 3.11; 95% CI, 1.43-4.80), and patient satisfaction (β = 0.57; 95% CI, 0.30-0.84), and lower procedure rates (β = −0.47; 95% CI, −0.79 to −0.16). There were no significant differences in access, discharges, inpatient days, and readmission probability. The association between PLHPs and outcomes differed by plan size, nonprofit status, and region.

CONCLUSIONS: Receipt of care within a PLHP was associated with improved quality, effectiveness, and patient satisfaction, as well as lower procedure rates. As providers bear increasing financial risk under alternative payment models, there is momentum to integrate healthcare provision and payment through PLHPs. Our results demonstrate the potential of such organizations to deliver high-quality care, although opportunities remain to optimize utilization.

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As healthcare providers accept increasing financial risk in alternative payment models, more provider organizations are expected to operate their own health insurance plans, known as provider-led health plans (PLHPs). Over the past 2 decades, PLHPs have become increasingly popular in the United States, with more than 100 plans covering more than 15 million individuals.[1,2] Often referred to as vertical integration, the integration of healthcare providers and payers offers potential advantages to the patient, provider, and system. By inherently aligning payer–provider incentives and managing healthcare across a continuum of services, PLHPs may be particularly advantageous in population health management and, therefore, may have superior outcomes with lower premiums compared with non-PLHPs.[1-8]

Our knowledge of the impact of PLHPs on outcomes remains limited and inconsistent.[1-14] For instance, critics of PLHPs argue that they are not consistently associated with higher-quality healthcare and can lead to increased costs due to greater market power and administrative costs.[10-14] Furthermore, it remains unknown how PLHP characteristics, including size, region, and nonprofit status, may affect outcomes. For example, nonprofit plans may perform better than for-profit plans,[15] and larger plans may perform better than smaller plans through increased experience.

The objectives of this study were therefore to (1) determine the association between PLHP status and healthcare quality, utilization, and patient satisfaction and (2) determine whether these associations differed by plan size, nonprofit status, and region.

METHODS

We conducted an observational study of Medicare Advantage (MA) contracts using December 2016 MA enrollment data from CMS. We focused on MA due to its large population and available outcome data that allow for standardized comparisons.[16] We identified all MA contracts offered in 2016 with more than 20,000 enrollees to increase generalizability. For each contract, we obtained information on 3 quality outcomes, 4 utilization outcomes, and 1 patient satisfaction outcome. The quality outcomes were the 2017 MA Star Rating

System (5-star maximum); 2016 Healthcare Effectiveness Data and Information Set (HEDIS) effectiveness aggregate score, defined as the average of 55 HEDIS Effectiveness of Care measures (100% maximum); and 2016 HEDIS access aggregate score, defined as the average of 2 HEDIS Access of Care measures (100% maximum). The utilization outcomes were 2016 HEDIS measures and included procedure rates, defined as average procedure rates per 1000 members for 13 selected procedures; discharge rates, defined as risk-adjusted discharges per 1000 members; inpatient days, defined as inpatient days per 1000 member-months; and risk-adjusted readmission probability. The patient satisfaction outcome was the 2016-2017 National Committee for Quality Assurance consumer satisfaction ratings, which are based on 2016-2017 Consumer Assessment of Healthcare Providers and Systems (CAHPS) surveys (5-point maximum) (see **eAppendix Table 1** for outcome details [eAppendix available at **ajmc.com**]).

TAKEAWAY POINTS

- In this cross-sectional study of 2016 Medicare Advantage plans, provider-led health plans (PLHPs) were associated with higher quality, effectiveness, and patient satisfaction and decreased procedure rates compared with non-PLHPs.
- The association between PLHPs and outcomes differed by plan size, nonprofit status, and region.
- There were no significant differences between PLHPs and non-PLHPs in access, number of inpatient discharges, duration of stay, and readmission probability.
- As alternative payment models grow in popularity and momentum builds for providers to start their own health plans, our results demonstrate the potential of PLHPs to deliver higher-quality care and patient satisfaction, although opportunities remain to optimize utilization.

We categorized each MA contract as belonging to a PLHP or non-PLHP based on a publicly available list from the Robert Wood Johnson Foundation,[10] which we enhanced to include additional PLHPs based on lists from McKinsey and Avalere (**eAppendix Table 2**).[1,2,10,17] When there was uncertainty about PLHP status, we conducted an internet search to verify. We obtained region and profit status from the December 2016 MA enrollment list and patient risk from 2015 CMS plan payment data.[18,19]

To compare how outcomes differed between PLHP and non-PLHP contracts, we constructed multivariable linear regression models using generalized estimating equations with exchangeable correlation matrices to account for correlation between contracts within health plans. For example, Aetna's health plan offered 25 MA contracts in our data set. The model controlled for accessible covariates identified as meaningful from existing literature,[1,6,15] including MA region, contract profit status, average MA patient risk score, and the following covariates, all of which were derived from Area Health Resources Files[20] and weighted for county contract enrollment: percent urban residence, percent black/African American, mean per capita income, college education among population 25 years or older, percent poverty among population 65 years or older, population 65 years or older per 1000 population, hospital beds per 1000 population, and active physicians per 1000 population. Each contract was analytically weighted by enrollee number.

We conducted subgroup analyses to evaluate how the association between PLHP contracts and outcomes differed by PLHP size, profit status (for-profit vs nonprofit), and MA region. To assess outcome differences by size, we compared outcomes of the 6 PLHPs with at least 100,000 enrollees (Kaiser Permanente, UPMC, Healthfirst, Spectrum, Innovacare, and Tufts) with those of the remaining PLHPs. To assess PLHP effects stratified by region, we mapped our model results for each MA region, differentiating areas where PLHPs performed significantly better than non-PLHPs, worse than non-PLHPs, or where there was no difference. Subgroup analyses were based on the multivariable model above, except for regional analyses. Regional analyses only adjusted for profit status and patient risk score because the inclusion of additional covariates prevented the model from producing estimates for many regions. Finally, to explore whether our findings were driven by Kaiser Permanente, a notably high-quality plan, we ran our base-case models after excluding Kaiser Permanente contracts.

Analyses were performed using Stata 14 (StataCorp LP; College Station, Texas) and SAS 9.4 (SAS Institute Inc; Cary, North Carolina). Further information on data sources, variable definitions, and missing data is available in eAppendix Table 1 and **eAppendix Table 3**.

RESULTS

Our study population included 64 contracts offered by 31 PLHPs (representing 3,197,284 enrollees) and 311 contracts offered by 55 non-PLHPs (representing 13,881,210 enrollees) (**Table 1**). Unadjusted mean star ratings, effectiveness, access, and patient satisfaction were higher among PLHPs compared with non-PLHPs, whereas procedure rates, inpatient discharges, and inpatient days were lower.

In adjusted models, PLHPs were associated with higher star ratings (β = 0.41; 95% CI, 0.15-0.67), effectiveness (β = 3.11; 95% CI, 1.43-4.80), and patient satisfaction (β = 0.57; 95% CI, 0.30-0.84) compared with non-PLHPs. Procedure rates were lower for PLHPs than non-PLHPs (β = −0.47; 95% CI, −0.79 to −0.16). There were no significant differences in access, inpatient discharges, inpatient days, and readmission probability (Table 1).

Table 2 illustrates the results from subgroup analyses, which demonstrated that larger PLHPs had significantly higher star ratings (β = 0.57; 95% CI, 0.28-0.86), effectiveness (β = 4.63; 95% CI, 2.45-6.80), and patient satisfaction (β = 0.78; 95% CI, 0.54-1.02) compared with smaller PLHPs. After excluding Kaiser Permanente, PLHPs still had significantly higher star ratings (β = 0.22; 95% CI, 0.01-0.43), effectiveness (β = 1.22; 95% CI, 0.47-1.97), and patient satisfaction (β = 0.43; 95% CI, 0.12-0.73). Compared with nonprofit PLHPs, for-profit PLHPs had significantly lower star ratings (β = −1.07; 95% CI, −1.62 to −0.52), effectiveness (β = −5.59; 95% CI, −8.22 to −2.96), access (β = −7.66; 95% CI, −12.27 to −3.06), and patient satisfaction (β = −1.38; 95% CI, −2.70 to −0.06).

TABLE 1. Characteristics of MA Plans by PLHP Status and Results From Adjusted Analyses[a] for the Association Between PLHPs and Outcomes

Characteristics	PLHP (n = 64)[a]	Non-PLHP (n = 311)[a]		
Enrollees, n (%)	3,197,284 (19)	13,881,210 (81)		
Enrollment in nonprofit plans, %	76	22		
MA patient risk score,[b] mean (SD)	1.04 (0.16)	1.12 (0.25)		
Residence in urban areas, %	87	81		
Black/African American, %	8.8	12.2		
Per capita income, mean (SD)	$49,342 ($13,772)	$45,045 ($9058)		
≥65 years and in poverty, %	3.4	3.0		
Population ≥65 years/1000 population, mean (SD)	150 (25)	156 (23)		
With college education, %	32	28		
Hospital beds/1000 population, mean (SD)	2.6 (0.65)	2.9 (0.50)		
Active physicians/1000 population, mean (SD)	3.1 (0.71)	2.8 (0.67)		
	Unadjusted Mean (SD)		Multivariable Model[c]	
Outcomes	PLHP	Non-PLHP	β (95% CI)	*P*
Quality				
MA Star Rating System (5-star maximum)[b]	4.58 (0.49)	3.89 (0.49)	0.41 (0.15-0.67)	.006
HEDIS effectiveness score (100% maximum)[b]	66.1 (2.97)	62.5 (2.57)	3.11 (1.43-4.80)	.001
HEDIS access score (100% maximum)	44.98 (4.50)	43.15 (4.72)	1.79 (−0.27 to 3.85)	.09
Utilization				
HEDIS procedures/1000 members	4.30 (1.25)	5.46 (0.95)	−0.47 (−0.79 to −0.16)	.004
HEDIS discharges/1000 members	183 (42.3)	212 (39.0)	−14.1 (−29.3 to 1.07)	.07
HEDIS inpatient days/1000 member-months[b]	884 (317)	1203 (475)	−54.4 (−164 to 55.5)	.33
HEDIS adjusted readmission probability[b]	0.15 (0.01)	0.15 (0.01)	−0.002 (−0.006 to 0.002)	.3
Patient satisfaction				
NCQA consumer satisfaction (5-point maximum)[b]	3.89 (0.59)	3.31 (0.71)	0.57 (0.30-0.84)	<.001

HEDIS indicates Healthcare Effectiveness Data and Information Set; MA, Medicare Advantage; NCQA, National Committee for Quality Assurance; PLHP, provider-led health plan.

[a]There were 64 PLHP contracts belonging to 31 PLHPs and 311 non-PLHP contracts belonging to 55 non-PLHPs.

[b]Unadjusted means were statistically significant (*P* <.05).

[c]Results from multivariable model are from multivariable linear regression models that (1) controlled for MA region, MA average patient risk, and plan profit status and (2) were weighted for plan enrollment by county, prevalence of urban residence, proportion black/African American, mean per capita income, prevalence of receipt of college education among population 25 years or older, population 65 years or older per 1000 population, prevalence of poverty among elderly enrollees, hospital beds per 1000 population, and active physicians per 1000 population. The β coefficients reflect the association between PLHP status and the respective outcome. For instance, the β coefficient for star rating (0.41) means that, after adjustment for all covariates listed in the methods, star ratings were 0.41 higher for PLHPs than for non-PLHPs (*P* = .006).

The **eAppendix Figure** reflects the significance and direction of differences between PLHPs and non-PLHPs for each outcome by MA region. PLHPs performed significantly better than non-PLHPs in the following number of regions and outcomes, respectively: 6 of 16 regions for effectiveness, 5 of 16 for procedure frequency, 4 of 16 for inpatient days, 3 of 16 for star ratings and inpatient discharges, 3 of 12 for patient satisfaction, and 2 of 16 for access and readmission probability. PLHPs performed significantly worse than non-PLHPs in the following number of regions and outcomes, respectively: 2 of 16 for access, inpatient days, and readmission probability; 1 of 16 for selected procedure frequency; 1 of 12 for patient satisfaction; and 0 of 16 for star ratings, effectiveness, and inpatient discharges. Although regions in which PLHPs performed better than non-PLHPs generally varied by outcome, PLHPs performed consistently better in most outcomes in regions that included Texas, Illinois, and Wisconsin (**eAppendix Table 4**).

DISCUSSION

The results of our analyses show that MA contracts offered by PLHPs are associated with greater quality and patient satisfaction and decreased procedures. We further found that the effects of PLHP vary by size, nonprofit status, and region, with larger and nonprofit PLHPs performing better than their smaller and for-profit counterparts, respectively.

Our results on healthcare quality and patient satisfaction are consistent with findings by Johnson et al and Lyon et al, who found that PLHP MA contracts were associated with superior performance in quality and satisfaction measures.[1,6] Prior literature on the impact of vertical integration on utilization has shown mixed results, with some studies' results suggesting decreased utilization[3,5,7,8] and others' suggesting increased utilization.[10,12,13] Although few studies have investigated access, Lyon et al demonstrated decreased provider

TABLE 2. Results From Adjusted Subgroup Analyses[a] for the Association Between PLHPs and Selected Outcomes

	Large[b] PLHP vs Small PLHP		Non–Kaiser Permanente PLHP vs Non-PLHP		For-Profit PLHP vs Nonprofit PLHP	
Outcomes	**β (95% CI)**	***P***	**β (95% CI)**	***P***	**β (95% CI)**	***P***
Quality						
MA Star Rating System	0.57 (0.28-0.86)	<.001	0.22 (0.01-0.43)	.04	−1.07 (−1.62 to −0.52)	<.001
HEDIS effectiveness aggregate score	4.63 (2.45-6.80)	<.001	1.22 (0.47-1.97)	.002	−5.59 (−8.22 to −2.96)	<.001
HEDIS access aggregate score	2.96 (0.18-5.74)	.04	−0.18 (−1.51 to 1.16)	.79	−7.66 (−12.27 to −3.06)	.002
Utilization						
HEDIS procedures/1000 members	−0.53 (−1.00 to −0.07)	.03	−0.33 (−0.71 to −0.04)	.08	−0.43 (−1.61 to 0.74)	.46
HEDIS discharges/1000 members	−9.11 (−29.3 to 11.1)	.37	−8.53 (−24.3 to 7.26)	.29	−16.4 (−43.6 to 10.7)	.23
HEDIS inpatient days/1000 member-months	6.04 (−129 to 141)	.93	−19.2 (−152 to 114)	.77	−40.5 (−217 to 136)	.64
HEDIS adjusted readmission probability	0.001 (−0.004 to 0.006)	.62	−0.003 (−0.008 to 0.001)	.15	0.0007 (−0.010 to 0.010)	.99
Patient satisfaction						
NCQA consumer satisfaction	0.78 (0.54-1.02)	<.001	0.43 (0.12-0.73)	.008	−1.38 (−2.70 to −0.06)	.04

HEDIS indicates Healthcare Effectiveness Data and Information Set; MA, Medicare Advantage; NCQA, National Committee for Quality Assurance; PLHP, provider-led health plan.

[a]Results are from multivariable linear regression models that (1) controlled for MA region, MA average patient risk, and profit status and (2) were weighted for plan enrollment by county, prevalence of urban residence, proportion black/African American, mean per capita income, prevalence of receipt of college education among population 25 years or older, population 65 years or older per 1000 population, prevalence of poverty among elderly enrollees, hospital beds per 1000 population, and active physicians per 1000 population. The β coefficients reflect the association between the type of plan noted and the respective outcome. For instance, the β coefficient for star ratings for large versus small plans (0.57) means that, after adjustment for all covariates listed in the methods, star ratings were 0.57 higher for PLHPs than for non-PLHPs (*P* <.001).

[b]Large PLHPs are defined as the 6 health plans with greater than 100,000 enrollees in MA plans. These plans include Kaiser Permanente, UPMC, Healthfirst, Spectrum, Innovacare, and Tufts.

access among PLHPs.[6] Comparison with prior studies is nevertheless challenging, as some failed to differentiate between vertical and other forms of integration (eg, horizontal integration through provider consolidation), did not distinguish between separate outcome domains, and lacked standardized, timely outcomes. Our results are an important and distinctive contribution to existing literature because we evaluated the association between PLHPs and separate but standardized outcomes that reflect quality, access, utilization, and patient satisfaction.

PLHPs' higher quality and satisfaction performance could be due to multiple factors. PLHPs may leverage the strengths and resources of insurers and providers to achieve common goals of delivering high-quality patient care. Potential resources include enhanced coordination between insurers and providers, use of unified electronic health records, integration of initiatives focused on high-value care, and streamlined interactions between patients and providers. Importantly, the populations served by PLHPs were lower risk than non-PLHPs and had nonsignificant trends toward being wealthier, more educated, and with fewer minorities. Although we adjusted for these differences in multivariable models, it is possible that we observed superior quality outcomes among PLHPs due to demographic-based differences. Nevertheless, we observed no differences in access, inpatient days, discharges, or readmissions, thus identifying a need for PLHPs to streamline and optimize utilization.

We uniquely assessed how the effect of PLHPs differs with plan characteristics, identifying important differences in outcomes based on size, nonprofit status, and region. This suggests that not all PLHPs are alike, with the heterogeneity potentially being caused by multiple factors. First, plans could have differences in organizational commitment to their populations. For example, commitment could be stronger in regions that emphasize population health and among larger plans that bear increased risk. Second, the complex relationship between plan enrollment and quality is important to consider: On one hand, larger plans seem more established as PLHPs and, therefore, may have more experience with the model, resulting in higher quality and efficiency; on the other hand, large plan size could result from the plan itself being high quality, as higher-quality plans tend to have higher enrollment.[18] Third, although we adjusted for several demographic-based covariates, it is possible that the effect of PLHPs varies by their populations' needs. For example, populations in Texas, Wisconsin, and Illinois may benefit more from vertical integration due to varying clinical needs and demographics. Fourth, our findings that nonprofit PHLPs performed better than for-profit PLHPs are consistent with previous literature[15] and suggest that population health approaches differ by profit status, potentially due to differences in underlying incentives. Fifth, there is heterogeneity in the extent of integration employed by PLHPs. For example, some PLHPs restrict providers and enrollees within their own PLHP systems, whereas in others, providers and enrollees are permitted to see non-PLHP patients and be seen by non-PLHP providers, respectively. As a result, PLHPs with less mutual exclusivity in respective provider and payer markets may have less alignment of payer–provider incentives compared with more restrictive plans. Finally, PLHPs may take advantage of varying aspects of integration in their initiatives.[2] For instance, some PLHPs might have a more unified electronic health record

than others, whereas other PLHPs might have more collaborative payer–provider care management programs.

Although prior studies identified characteristics associated with health plan and accountable care organization success,[15,21,22] future research could investigate factors and approaches associated with successful PLHPs.

Limitations

Given that this is a cross-sectional study, we can make no inferences regarding causality. It is possible that high-performing providers practice in PLHPs or that health-seeking patients enroll in such plans. Second, some plans did not have data available for certain outcomes. However, the likelihood of missing data did not significantly vary between PLHPs and non-PLHPs and is therefore unlikely to bias results (eAppendix Table 3). Third, although we adjusted for differences between PLHPs and non-PLHPs, our findings may still be subject to residual confounding due to unobserved effects. Fourth, we did not adjust for market competition, which can impact pricing, networks, and population health approaches. Finally, our outcomes are not independent because star ratings include components of HEDIS and CAHPS in their calculations. Nevertheless, assessing PLHP effects on these outcomes is valuable because star ratings represent important composite measures, whereas HEDIS and CAHPS scores inform which domains may drive star ratings differences.

CONCLUSIONS

As alternative payment models grow, momentum is building to integrate provision and payment of care through PLHPs. Our analysis of 2016 MA plans demonstrates the potential of such organizations to deliver high-quality care, although opportunities remain in optimizing utilization. ■

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eAppendix

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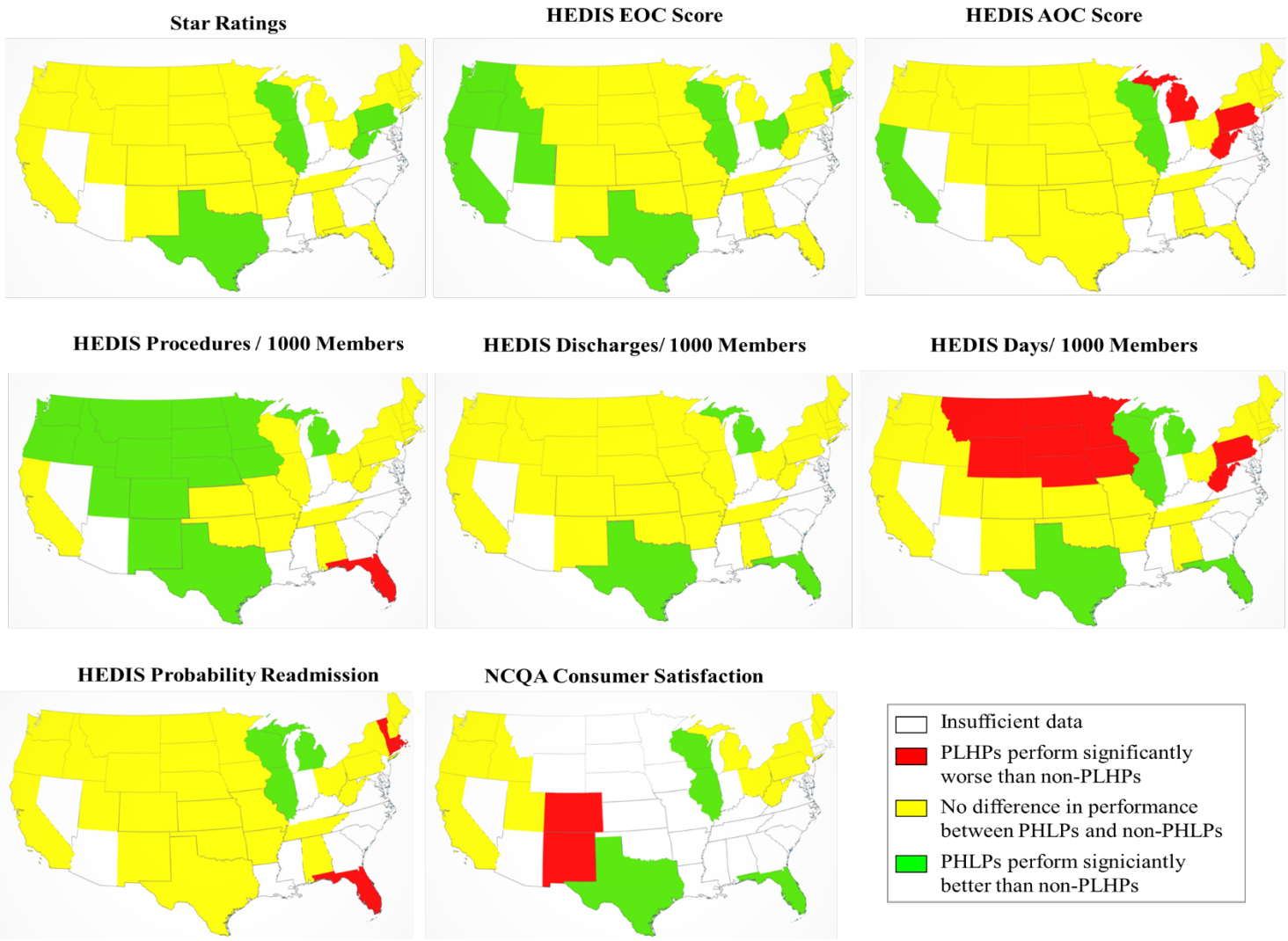
eAppendix Figure. Relationship between PLHPs Status and Outcomes by Medicare Advantage Region[a]



NOTES: Abbreviations: PLHP, provider-led health plans; HEDIS®, Healthcare Effectiveness Data and Information Set; NCQA, National Committee for Quality Assurance; MV, multivariable; CI, confidence interval.

[a] Results from multivariable linear regression models controlled for Medicare Advantage Region, Medicare Advantage average patient risk, and profit status

eAppendix Table 1. Covariate/Outcome Data Source and Description

Covariate/Outcome	Source	Description
Medicare Advantage Plan list, profit status, region	2016 CMS Medicare Advantage Enrollment Data	Data publicly available on CMS web site; December 2016 data used
Medicare Advantage Average Patient Risk Score	2015 CMS Plan Payment Data	Calculated risk score takes into account age, gender, socioeconomic status, disability status, diagnosis codes and severity, frailty index, and special needs plan status
2017 Medicare Advantage Star Ratings	2017 CMS Medicare Advantage Star Ratings	Derived from Healthcare Effectiveness Data and Information Set (HEDIS®), Consumer Assessment of Healthcare Providers and Systems (CAHPS®), Health Outcomes Survey, Complaint Tracking Module, Independent Review Entity, and Prescription Drug Event data
HEDIS® EOC Aggregate Score	2016 HEDIS® Ratings by Plan	Calculated average of 55 EOC Measures with maximum score for each being 100%, including: breast cancer screening, follow-up after hospitalization for mental illness (7-day and 30-day), comprehensive diabetes care (A1c testing, A1c control, retinopathy screening, nephropathy screening, blood pressure control), effective acute phase antidepressant treatment, effective continuation phase antidepressant treatment, controlling high blood pressure, colorectal cancer screening, osteoporosis management in women with fracture, beta blocker treatment after heart attack, management of urinary incontinence of older adults, disease modifying anti-rheumatic drug therapy in rheumatoid arthritis, use of high-risk medications in the elderly, annual monitoring for patients on persistent medications (ACE inhibitors/ARBs, digoxin, diuretics, and total), use of spirometry testing in the assessment and diagnosis of COPD, physical activity in older adults (discussing and advising), potentially harmful drug-disease interactions in the elderly, fall risk management, osteoporosis testing in older women, pharmacotherapy management of COPD exacerbation, adult BMI assessment, medication reconciliation post-discharge, non-recommended PSA-based screening in older men, statin therapy for patients with cardiovascular disease, statin therapy for patients with diabetes, medication management for people with asthma, asthma medication ratio
HEDIS® AOC Aggregate Score	2016 HEDIS® Ratings by Plan	Calculated average of 2 AOC Measures with maximum score for each being 100%, including: Adults' Access to Preventive/Ambulatory Health Services and Initiation and Engagement of Alcohol and Other Drug Dependence Treatment
HEDIS® Procedures/1000 members	2016 HEDIS® Ratings by Plan	Average frequency of 13 selected procedures/1000 members, including: CABG, PCI, cardiac catheterization, carotid endarterectomy, total hip replacement, total knee replacement, cholecystectomy, prostatectomy, hysterectomy, mastectomy, lumpectomy, back surgery, bariatric weight loss
HEDIS® Discharges/1000 members	2016 HEDIS® Ratings by Plan	For members 18 years of age and older, the risk-adjusted ratio of observed to expected acute inpatient discharges during the measurement year (includes surgery and medicine)
HEDIS® Inpatient Days/1000 member-months	2016 HEDIS® Ratings by Plan	Inpatient days/1000 member-months within a measurement year, which includes medicine, surgery, and maternity
HEDIS® Average adjusted probability of readmission	2016 HEDIS® Ratings by Plan	For members 18 years of age and older, the predicted probability of an acute readmission based on observed readmission rate and risk-adjusted for patient demographics and complexity.
NCQA Consumer Satisfaction	NCQA	Based on CAHPS® survey responses related to getting care, satisfaction with plan physicians, and satisfaction with plan services

Abbreviations: CMS, Center for Medicare and Medicaid Services; HEDIS®, Healthcare Effectiveness Data and Information Set; EOC, Effectiveness of Care; AOC, Access of Care; NCQA, National Committee for Quality Assurance; CAHPS®, Consumer Assessment of Healthcare Providers and Systems

eAppendix Table 2. Provider-Led Health Plan and Organization List

Parent Organization	State	Plan Name
Kaiser Foundation Health Plan, Inc.	CO	'KAISER FOUNDATION HP OF CO
Trinity Health	OH	'MOUNT CARMEL HEALTH INSURANCE COMPANY Trinity
Baylor Scott & White Holdings	TX	'SCOTT AND WHITE HEALTH PLAN
The Carle Foundation	IL	'HEALTH ALLIANCE - MIDWEST, INC.
UPMC Health System	PA	'UPMC FOR YOU, INC
Geisinger Health System	PA	'GEISINGER HEALTH PLAN
Health First, Inc.	FL	HEALTH FIRST HEALTH PLANS
Summa Health System	OH	'SUMMACARE INC.
Catholic Health Initiatives	WA	'SOUNDPATH HEALTH CHI
Aultman Health Foundation	OH	'AULTCARE HEALTH INSURING CORPORATION
InnovaCare Inc.	PR	'MMM HEALTHCARE, LLC Innovacare
Group Health Cooperative	WA	'GROUP HEALTH COOPERATIVE
UPMC Health System	PA	'UPMC HEALTH NETWORK, INC.
Spectrum Health System	MI	'PRIORITY HEALTH Spectrum
Providence Health & Services	OR	'PROVIDENCE HEALTH ASSURANCE
Henry Ford Health System	MI	'HAP MIDWEST HEALTH PLAN, INC.
CommunityCare Managed Healthcare Plans of OK, Inc.	OK	'COMMUNITY CARE HMO, INC
Tufts Associated HMO, Inc.	MA	Tufts Associated HMO, Inc.
Kaiser Foundation Health Plan, Inc.	OR	'KAISER FOUNDATION HP OF THE N W
Healthfirst, Inc.	NY	'HEALTHFIRST HEALTH PLAN, INC.
Henry Ford Health System	MI	'HEALTH ALLIANCE PLAN OF MICHIGAN
Catholic Health Initiatives	AR	'QUALCHOICE ADVANTAGE CHI
SSM Healthcare Corporation	WI	'DEAN HEALTH PLAN, INC.
Catholic Health Initiatives	NE	'HEARTLANDPLAINS HEALTH Catholic Health Initiatves
Kaiser Foundation Health Plan, Inc.	CA	'KAISER FOUNDATION HP, INC.
Health First, Inc.	FL	'HEALTH FIRST HEALTH PLANS
Intermountain Health Care, Inc.	UT	'SELECTHEALTH, INC. Intermountain
Capital District Physicians' Health Plan, Inc.	NY	'CDPHP UNIVERSAL BENEFITS, INC.
Healthfirst, Inc.	NY	'HEALTHFIRST HEALTH PLAN, INC.
The Carle Foundation	WA	'HEALTH ALLIANCE NORTHWEST HEALTH PLAN, INC.
Tufts Associated HMO, Inc.	MA	Tufts Associated HMO, Inc.

Baylor Scott & White Holdings	TX	'INSURANCE COMPANY OF SCOTT AND WHITE
Henry Ford Health System	MI	'ALLIANCE HEALTH AND LIFE INSURANCE COMPANY
Geisinger Health System	PA	'GEISINGER INDEMNITY INSURANCE COMPANY
Presbyterian Healthcare Services	NM	'PRESBYTERIAN INSURANCE COMPANY, INC.
Martin's Point Health Care, Inc.	ME	'MARTIN'S POINT GENERATIONS ADVANTAGE, INC.
AHMC Central Health LLC	CA	'CENTRAL HEALTH PLAN OF CALIFORNIA, INC. AHMC
InnovaCare Inc.	PR	'MMM HEALTHCARE, LLC Innovacare
Capital District Physicians' Health Plan, Inc.	NY	'CAPITAL DISTRICT PHYSICIANS' HEALTH PLAN, INC.
Martin's Point Health Care, Inc.	ME	'MARTIN'S POINT GENERATIONS ADVANTAGE, INC.
Kaiser Foundation Health Plan, Inc.	CA	KAISER FOUNDATION HP, INC.
Henry Ford Health System	MI	'HAP MIDWEST HEALTH PLAN, INC.
HealthPartners, Inc.	MN	'GROUP HEALTH PLAN, INC. (Health Partners Inc)
UPMC Health System	PA	'UPMC HEALTH PLAN, INC.
Kelsey-Seybold Medical Group, PLLC	TX	'KS PLAN ADMINISTRATORS, LLC
Kaiser Foundation Health Plan, Inc.	MD	'KAISER FNDN HP OF THE MID-ATLANTIC STS
The Carle Foundation	IL	'HEALTH ALLIANCE - MIDWEST, INC.
Kaiser Foundation Health Plan, Inc.	HI	'KAISER FOUNDATION HP, INC.
Trinity Health	OH	'MOUNT CARMEL HEALTH PLAN, INC. Trinity
Geisinger Health System	PA	'GEISINGER QUALITY OPTIONS, INC.
The Carle Foundation	IL	'HEALTH ALLIANCE CONNECT, INC.
Marshfield Clinic Health System, Inc.	WI	'SECURITY HEALTH PLAN OF WISCONSIN, INC. Marshfield Clinic
Kaiser Foundation Health Plan, Inc.	GA	'KAISER FOUNDATION HP OF GA, INC.
Essence Group Holdings Corporation	MO	'ESSENCE HEALTHCARE, INC.
HealthPartners, Inc.	MN	'HEALTHPARTNERS, INC.
SSM Healthcare Corporation	WI	'DEAN HEALTH PLAN, INC.
Presbyterian Healthcare Services	NM	'PRESBYTERIAN HEALTH PLAN
Ministry Health Care, Inc.	WI	NETWORK HEALTH INSURANCE CORPORATION
Catholic Health Initiatives	OH	RIVERLINK HEALTH CHI
UAB Health System	AL	VIVA HEALTH, INC.
InnovaCare Inc.	PR	'MMM HEALTHCARE, LLC Innovacare

eAppendix Table 3. Missing Data by Covariate/Outcome*****

Covariate/Outcome	% (enrollees)
Medicare Advantage Patient Risk Score	5.7 (969,940)
2017 Medicare Advantage Star Ratings	1.9 (329,269)
HEDIS® EOC Aggregate Score	1.7 (287,100)
HEDIS® AOC Aggregate Score	1.7 (287,100)
HEDIS® Procedures/1000 Members	3.3 (555,117)
HEDIS® Discharges/1000 Members	2.4 (410,514)
HEDIS® Inpatient Days/1000 Member-Months	3.1 (526,041)
HEDIS® Average Adjusted Probability of Readmission	5.7 (968,503)
NCQA Consumer Satisfaction	20 (3,494,549)

Abbreviations: HEDIS®, Healthcare Effectiveness Data and Information Set; EOC, Effectiveness of Care; AOC, Access of Care; NCQA, National Committee for Quality Assurance
*Among plans with missing data, there were no significant differences in likelihood of being a PLHP.

eAppendix Table 4. Comparison of PLHPs and non-PLHPs by Region, ß and p-values

state	region	star_rating	star_rating_	eoc	eoc_p	aoc	aoc_p	proc	proc_p	discharg	discharg	inptdays	inptday	admprob	nprob_p	cs	cs_p
NH	1	0.07	0.94	0.77	0.408	4.69	0.240	-1.45	0.137	43.65	0.330	401.54	0.361	0.004	0.343	0.948	0.112
ME	1	0.07	0.94	0.77	0.408	4.69	0.240	-1.45	0.137	43.66	0.331	401.54	0.361	0.004	0.343	0.948	0.112
CT	2	0.35	0.082	4.63	0.015	0.05	0.965	-0.06	0.811	22.33	0.386	131.83	0.307	0.009	0.043		
MA	2	0.35	0.082	4.63	0.015	0.05	0.965	-0.06	0.811	22.33	0.386	131.83	0.307	0.009	0.043		
RI	2	0.35	0.082	4.63	0.015	0.05	0.965	-0.06	0.811	22.33	0.386	131.83	0.307	0.009	0.043		
VT	2	0.35	0.082	4.63	0.015	0.05	0.965	-0.06	0.811	22.33	0.386	131.83	0.307	0.009	0.043		
NY	3	0.31	0.185	1.36	0.163	0.035	0.976	-0.08	0.704	12.95	0.328	132.40	0.515	0.003	0.307	0.599	0.315
NJ	4																
DE	5																
DC	5																
MD	5																
PA	6	0.363	0.035	-0.35	0.753	-1.99	0.008	-0.006	0.987	10.02	0.520	131.38	0.024	9E-05	0.985	0.142	0.671
WV	6	0.363	0.035	-0.35	0.753	-1.99	0.008	-0.006	0.987	10.02	0.520	131.38	0.024	9E-05	0.985	0.142	0.671
NC	7																
VA	7																
GA	8															0.029	0.977
SC	8															0.029	0.977
FL	9	0.17	0.498	0.996	0.229	1.34	0.448	0.38	0.01	-31.20	0.013	-186.42	0.011	0.004	0.019	0.901	0.003
AL	10	1.08	0.165	-2.88	0.33	0.75	0.439	-0.51	0.755	32.06	0.488	221.73	0.294	-0.0048	0.851		
TN	10	1.08	0.165	-2.88	0.33	0.75	0.439	-0.51	0.755	32.06	0.488	221.73	0.294	-0.0048	0.851		
MI	11	-0.32	0.252	0.752	0.140	-1.25	0.009	-0.835	0.05	-47.11	0.002	-102.22	0.002	-0.012	0.023	0.608	0.167
OH	12	0.22	0.636	3.12	0.005	-3.22	0.381	0.911	0.085	20.41	0.417	57.22	0.298	-0.0097	0.321	0.229	0.645
IN	13																
KY	13																
IL	14	1.09	<0.001	3.33	0.013	3.22	0.001	0.039	0.954	-11.67	0.490	-503.21	<0.001	-0.016	<0.001	0.954	0.007
WI	14	1.09	<0.001	3.33	0.013	3.22	0.001	0.039	0.954	-11.67	0.490	-503.21	<0.001	-0.016	<0.001	0.954	0.007
AR	15	0.043	0.563	-1.16	0.505	2.11	0.600	-0.059	0.860	-8.67	0.549	-59.33	0.560	0.001	0.521		
MO	15	0.043	0.563	-1.16	0.505	2.11	0.600	-0.059	0.860	-8.67	0.549	-59.33	0.560	0.001	0.521		
LA	16																
MS	16																
TX	17	1.29	0.012	5.26	0.016	3.52	0.695	-1.22	0.025	-57.55	0.022	-396.69	0.011	-0.013	0.109	1.94	0.003
KS	18	0.28	0.578	0.25	0.588	0.36	0.559	-0.4	0.579	17.43	0.575	100.94	0.575	0.005	0.575		
OK	18	0.28	0.578	0.25	0.588	0.36	0.559	-0.4	0.579	17.43	0.575	100.94	0.575	0.005	0.575		
IA	19	0.12	0.535	3.08	0.406	9.84	0.50	-1.49	<0.001	116.12	0.107	763.59	0.024	-0.0048	0.611		
MN	19	0.12	0.535	3.08	0.406	9.84	0.50	-1.49	<0.001	116.12	0.107	763.59	0.024	-0.0048	0.611		
MT	19	0.12	0.535	3.08	0.406	9.84	0.50	-1.49	<0.001	116.12	0.107	763.59	0.024	-0.0048	0.611		
NE	19	0.12	0.535	3.08	0.406	9.84	0.50	-1.49	<0.001	116.12	0.107	763.59	0.024	-0.0048	0.611		
ND	19	0.12	0.535	3.08	0.406	9.84	0.50	-1.49	<0.001	116.12	0.107	763.59	0.024	-0.0048	0.611		
SD	19	0.12	0.535	3.08	0.406	9.84	0.50	-1.49	<0.001	116.12	0.107	763.59	0.024	-0.0048	0.611		
WY	19	0.12	0.535	3.08	0.406	9.84	0.50	-1.49	<0.001	116.12	0.107	763.59	0.024	-0.0048	0.611		
CO	20	0.89	0.651	8.74	0.330	10.77	0.228	-1.74	<0.001	-5.46	0.450	12.83	0.890	-0.009	0.076	-1.19	0.002
NM	20	0.89	0.651	8.74	0.330	10.77	0.228	-1.74	<0.001	-5.46	0.450	12.83	0.890	-0.009	0.076	-1.19	0.002
AZ	21																
NV	22																
ID	23	0.371	0.097	3.17	0.001	-1.17	0.391	-1.03	0.004	-15.14	0.194	-54.08	0.559	0.0037	0.373	0.253	0.41
OR	23	0.371	0.097	3.17	0.001	-1.17	0.391	-1.03	0.004	-15.14	0.194	-54.08	0.559	0.0037	0.373	0.253	0.41
UT	23	0.371	0.097	3.17	0.001	-1.17	0.391	-1.03	0.004	-15.14	0.194	-54.08	0.559	0.0037	0.373	0.253	0.41
WA	23	0.371	0.097	3.17	0.001	-1.17	0.391	-1.03	0.004	-15.14	0.194	-54.08	0.559	0.0037	0.373	0.253	0.41
CA	24	1.05	0.057	6.65	0.001	9.06	0.042	-0.59	0.309	4.54	0.835	-87.98	0.406	0.0002	0.928	-0.11	0.879
HI	25																
Verdict		3 better		6 better		2 better		5 better		3 better		4 better		2 better		3 better	
		13 no difference		10 no difference		12 no difference		10 no difference		13 no difference		10 no difference		12 no difference		8 no difference	
		0 worse		0 worse		2 worse		1 worse		0 worse		2 worse		2 worse		1 worse	
		star		eoc		aoc		proc		discharges		days		readm		consumer satisf	